REMARKS

I. Introduction

In response to the Office Action dated February 26, 2007, please add new claims 42-43, and consider the following remarks.

II. Office Action Double Patenting Rejection

In paragraphs 1 and 2, the Office Action provisionally rejects claims 27-42 under the judicially-created doctrine of double patenting as being unpatentable over claims 27-42 of co-pending application serial number 2004/0113838.

The Applicants respectfully traverse this rejection. Application serial number 2004/0113838 has issued as U.S. Patent No. 6,762,716, which does not include claims 27-42.

III. The Cited References and the Subject Invention

A. The Ghazvinian Reference

U.S. Patent No. 5,936,570, issued August 10, 1999 to Ghazvinian et al. discloses a system for acquiring the beacon of a satellite and synchronizing data transmission between the satellite and a ground terminal. The ground terminal conducts a search for a satellite to be acquired. The search may be based on previously developed information from which the location of the satellite can be predicted and, thus, limited to a small area of the sky, or cover a large area of the sky in accordance with a search routine. After the beacon of a satellite is acquired, the geographic area served by the satellite is determined. If the satellite does not serve the cell within which the ground terminal is located, a further satellite search is conducted, which may be based in part on information contained in the beacon of the acquired satellite. After the satellite serving the cell containing the ground terminal is acquired, a test is made to determine how long the satellite will continue to cover the cell. If the time period is short, communication waits until the next satellite to cover the cell is acquired. If the time period is long, communication is allowed to begin. The beacon is also used by the ground terminal to: (i) accurately time uplink data transmissions; (ii) estimate uplink Doppler, Doppler rate, and Doppler rate derivative and use this information to pre-compensate the carrier frequency of the uplink data transmissions for Doppler variations; and (iii) estimate the carrier frequency of downlink

data transmission(s) by continuously tracking the beacon carrier frequency and scaling the result by a suitable scaling factor.

B. The Patouraux Reference

U.S. Patent No. 6,804,986, issued October 19, 2004 to Patouraux discloses a method and apparatus for determining a calibrated value for the yaw angle of a satellite. The method allows the determination of the yaw angle of a satellite from the reading of two different sensors measuring the roll and/or pitch angles, provided that the reference point of the two sensors are not identical. A description is given basically for geostationary satellites but the method can be applied directly to satellites which are stationary with respect to any star. The method can be employed for circular and non-circular orbits.

IV. Office Action Prior Art Rejections

In paragraph 3, the Office Action rejected claims 27-42 under 35 U.S.C. § 103 as unpatentable over Ghazvinian in view of Patouraux. Applicants respectfully traverse these rejections.

With Regard to Claims 27 and 35: Claim 35 recites:

An apparatus for reducing the asymmetry error in a beacon, wherein the beacon comprises of multiple beams, and each beam is formed from a multiplicity of feed channels, comprising the step of:
means for computing asymmetry angles; and
means for using the asymmetry angles to correct the beacon sensor measurements.

According to the Office Action:

Regarding claim 35, Ghazvinian teaches means for computing asymmetry angles; and means for using the asymmetry angles to correct the beacon sensor measurements (Col. 2 lines 8-62).

The cited portion of the Ghazvinian reference recites:

In accordance with this invention a system for acquiring the beacon of a satellite serving a ground terminal and synchronizing data transmissions between the satellite and the ground terminal is provided. The ground terminal conducts a search for a satellite to be acquired. The search may be based on information resulting from prior data transmissions from which the location of the satellite can be predicted and, thus, limited to a small area of the sky, or cover a large area of the sky when no prediction information exists or the prediction information is unreliable. After the beacon of a satellite is acquired, the footprint of the satellite is determined.

> If the footprint of the satellite does not cover the cell in which the ground terminal is located, a further search is conducted, which may be based in part on information contained in the beacon of the acquired satellite. After the satellite serving the cell in which the ground terminal is located is acquired, the ground terminal is synchronized to the satellite.
>
> In accordance with further aspects of this invention, after the beacon of the satellite serving the ground terminal cell is acquired, a test is made to determine how long the satellite will continue to serve the cell. If the time period is short, communication waits until the next satellite to serve the ground terminal cell is positioned for acquisition. If the time period is long, communication is allowed to begin.
>
> In accordance with other aspects of this invention, the ground terminal uses the beacon to accurately point the antenna of the ground terminal toward the satellite serving the cell within which the ground terminal is located.
>
> In accordance with further aspects of this invention, the ground terminal uses the beacon to accurately time uplink data transmissions.
>
> In accordance with still other aspects of this invention, the ground terminal also uses the beacon to estimate uplink Doppler, Doppler rate, and Doppler rate derivative and uses the estimate to pre-compensate the carrier frequency of the uplink signal for Doppler and Doppler rate.
>
> In accordance with yet other aspects of this invention, the ground terminal uses the beacon to continuously track downlink carrier frequency by continuously tracking the beacon carrier frequency and scaling the result by a suitable scaling factor.
>
> As will be readily appreciated from the foregoing summary, the ground terminals of the LEO satellite data communication system use the beacon of the satellite serving a ground terminal in various ways to accomplish various results. Specifically, the beacon is used to enable accurate antenna pointing, uplink carrier frequency synchronization, data frame synchronization, and downlink carrier frequency synchronization. Such usage of the beacon enables the ground terminals to rapidly achieve network (e.g., satellite) acquisition and synchronization, and accurately time uplink traffic transmissions in order to maximize that data that may be transmitted to and from the serving LEO satellite.

The first paragraph of the foregoing text discloses the use of a beacon disposed on a satellite to aid in the acquisition of the satellite from a ground terminal. The second paragraph discloses that the after acquiring the satellite, the ground terminal determines ho long that satellite will continue to serve the cell in which the ground station resides. The third paragraph discloses the ground station using the beacon on the satellite to accurately point the ground terminal antenna. The remaining paragraphs detail more information regarding how beacon on the satellite is used to help the ground station to acquire and use the satellite.

However, the foregoing text does not disclose anything analogous to computing an asymmetry error in a beacon. The cited portions of the Ghazvinian reference teach using a satellite beacon to enable accurate acquisition and ground antenna pointing. Ghazvinian teaches a system wherein it is assumed that there are either no beacon beam errors (or that they can be neglected). Hence, there is no computation of asymmetry angles, and no notion of using asymmetry angles to

correct beacon sensor measurements. As far as the Applicants can ascertain, Ghazvinian, in fact, does not use the term "asymmetric" or any of its roots.

The Office Action also indicates:

> Patouraux teaches means for computing asymmetry angles; and means for using the asymmetry angles to correct the beacon sensor measurements (Col. 4 lines 40-61). Therefore, it would have been obvious at the time of the invention to one of ordinary skill in the art at the time the invention was made to incorporate a beacon sensor as taught by Patouraux into Ghazvinian's beacon signal in order to provide fast measurements (Col. 1 lines 47-59)

The cited portion of Patouraux recites:

> As an example, two sensors used on-board the ASTRA satellites are considered in the following, but different kinds of sensors may be used as well. One sensor is an optical infrared earth sensor assembly (ESA) with the subnadir point N (center of the earth) as its reference point. The other sensor is a beacon sensor with the ground station G as its reference point. Each sensor issues roll and pitch angle attitude errors defining the difference between the direction it points to, its "boresight", and its reference point (identified by points G and N). The satellite transmits the telemetry values of the measured roll and pitch angles of both sensors to the ground station which records them for further processing and/or analysis. The roll and pitch errors of at least one of the sensors are also sent to the on-board processor for roll and pitch control.
>
> It should be noted again that the method explained below extends to any kind of pair of sensors measuring roll and pitch angles or two linear combination of these angles, as long as the reference points G and N of the two sensors are different. In addition, the method can also readily be extended to a point N not being on the center of the earth.

The foregoing does not appear to disclose anything analogous to computing asymmetry angles or using such computed angles to correct beacon sensor measurements. In fact, the Patouraux reference does not appear to disclose any correction whatsoever to the beacon angles.

The Applicants also respectfully disagree that it would have been obvious at the time of the invention to one of ordinary skill in the art at the time the invention was made to incorporate a beacon sensor as taught by Patouraux into Ghazvinian's beacon signal in order to provide fast measurements. In fact, Ghazvinian and Patouraux describe entirely different and unrelated systems, and there does not appear to be any speed advantage in modifying Ghazvinian as described in Patouraux.

Claim 27 recites analogous features and is patentable for the same reasons.

With Respect to Claim 28 and 36: According to the Office action:

> ... Patouraux teaches wherein the means for using the asymmetry angles to correct the beacon sensor measurements includes means for using the asymmetry angles as beacon bias angles (Col. 4 lines 40-61).

As described above, Patouraux does not disclose asymmetry angles at all, and does not describe using them as bias angles. The analysis of claim 28 is analogous.

With Respect to Claim 29 and 37: According to the Office Action,

> ... Ghazvinian teaches wherein the means for using the asymmetry angles to correct the beacon sensor measurements includes means for using the asymmetry angles as time-varying beacon bias angles (Col. 2 lines 8-62).

The Applicants respectfully disagree, because Ghazvinian does not teach asymmetry angles.

V. Dependent Claims

Dependent claims 28-34 and 36-42 incorporate the limitations of their related independent claims, and are therefore patentable on this basis. In addition, these claims recite novel elements even more remote from the cited references. Accordingly, the Applicant respectfully requests that these claims be allowed as well.

VI. New Claims

New claims 42-43 are presented for the first time in this Amendment. For the reasons described above, new claims 42-43 are patentable over the prior art of record, and the Applicant respectfully requests the allowance of these claims as well.

VII. Conclusion

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

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